

Appl. No. 10/780,946
Amdt. dated 04/15/2008
Response to Office Action of 01/17/2008

Attorney Docket No.: N1085-00201
[N1280-175.2003-0489]

REMARKS/ARGUMENTS

Claims 1-23 are pending in the subject patent application with claims 9-16 having been previously withdrawn from examination. Claims 1-8 and 17-23 were examined and each has been rejected.

- 5 Claims 1 and 17 are amended herein. Applicants respectfully request re-examination, reconsideration and allowance of each of claims 1-8 and 17-23.

I. Rejection of Claims 1-8, 17-19 and 23

- 10 In paragraph 2 of the subject Office action, claims 1-8, 17-19 and 23 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Richter (USPUB 2002/0160318) in view of Nolscher (USPUB 2003/0143470). Applicants respectfully submit that these claim rejections are overcome for reasons set forth below.

- 15 Claims 1 and 17 represent the independent claims among the rejected claims. Each of claims 1 and 17 recites the feature of exposing a first set of patterns through an opening in a first mask and then exposing a subset of the first pattern, again, through openings in a second photomask. Two different photomasks are used and different light sources are used for the different exposure operations which liberate different photoresist dissolving agents, both of which are included in a single coat of photoresist. In the second exposure operation, only a sub-set of the areas previously exposed in the first exposure operation, are exposed a second time.

- 20 In particular, independent claim 1 recites:

 exposing a first set of areas of the photoresist to a first light source through a first mask; and

 exposing only a second set of areas of the photoresist to a second light source through a second mask; and

- 25 wherein the second set of areas is a sub set of the first set of areas such that the first and second photoresist dissolving agents in the second set of areas neutralize each other to

Appl. No. 10/780,946
Amdt. dated 04/15/2008
Response to Office Action of 01/17/2008

Attorney Docket No.: N1085-00201
[N1280-175.2003-0489]

protect the second set of areas from being used as the patterns for forming the openings.

Independent claim 17 recites the distinguishing features of:

5 using a packing mask for exposing a first set of areas of the photoresist to a first light source to activate a photoresist dissolving agent generator of a first type to release a first photoresist dissolving agent in the first set of areas; and

10 using an unpacking mask for activating a photoresist dissolving agent generator of a second type to release a second photoresist dissolving agent to neutralize the first photoresist dissolving agent only in one or more predetermined areas within the first set of the areas, thereby protecting the one or more predetermined areas from being used as the patterns for forming the openings.

15 Neither Richter nor Nolscher, nor the combination thereof, provides for exposing only a portion of the initially exposed features a second time. Richter only uses one photomask and exposes the entire wafer, i.e. the entire photoresist surface, during the second exposure. Nolscher exposes NO portion of the photoresist two times. Rather, Nolscher exposes a first set of features in the first photomask exposure process and a
20 second set of features in the second photomask exposure process.

More particularly, Richter, in describing the second photo exposure step, states "As a result of the irradiation without a photomask. . .", paragraph [0040] and the Examiner acknowledges, on page 3, penultimate paragraph, that "Richter fails to disclose that a packing and an unpacking mask are used during the two exposure
25 steps." Richter simply does not use two masks. Richter exposes the entire surface, not only a subset of the first set of features that were exposed the first time, during the second exposure.

In Nolscher, paragraph [0060], referring to FIG. 4 provides: *In this case, the uppermost row in each case illustrates the photomask for the first exposure, the middle
30 row illustrates the photomask for the second exposure, and the lower row illustrates the*

Appl. No. 10/780,946
Amdt. dated 04/15/2008
Response to Office Action of 01/17/2008

Attorney Docket No.: N1085-00201
[N1280-175.2003-0489]

resist structure obtained. The illustration of the transparent portions of the photomasks is bright, that of the light-absorbing portions is dark.

An examination of FIG. 4 of Nolscher shows that the features exposed in the second photomask, i.e. light portions of the photomask, were not exposed during the first photomask exposure operation. Rather, the light features in the second photomask were dark in the first photomask.

Nolscher simply uses a two mask sequence to eventually expose all the features to be exposed. The effect of the first exposure is the same as the effect of the second exposure: all of the exposed features are developed away (or remain, depending on the polarity of the photoresist used). Nolscher does not provide for exposing any particular area twice, much less exposing some areas twice so that the effect of the initial exposure is negated by neutralization, as in the claimed invention.

One of ordinary skill in the art and in possession of the Richter application would not combine the teachings of Richter with that of Nolscher because Richter absolutely relies upon selective neutralization of the doubly-exposed portions, such neutralization reaction occurring when the photobase generated during the first exposure combines with the photoacid liberated in the second exposure. As stated in paragraph [0034] of Richter, *As already described, photoacid generators are used together with photobase generators in the method according to the invention, the photoacid generator liberating an acid on exposure to light from a defined wavelength range $\Delta\lambda_1$ and the photobase generator liberating a base on exposure to light from a defined wavelength range $\Delta\lambda_2$.*

Each of claims 1 and 17 is therefore distinguished from Richter in view of Nolscher and the same is true for claims 2-8 and 18-23 by virtue of their respective dependencies from claims 1 and 17.

Therefore, the rejection of claims 1-8, 17-19 and 23 under 35 U.S.C. § 103(a), should be withdrawn.

Appl. No. 10/780,946
Amdt. dated 04/15/2008
Response to Office Action of 01/17/2008

Attorney Docket No.: N1085-00201
[N1280-175.2003-0489]

II. Rejection of Claims 20-22

In paragraph 3 of the subject Office action, claims 20-22 were rejected under 35 U.S.C. § 103(a) as being obvious over Richter in view of Nolscher and further in view of DeSimone (US Patent 6,929,904). Applicants respectfully submit that these claim
5 rejections are overcome for reasons set forth below.

Claims 20-22 depend from independent claim 17 which is distinguished from the combination of Richter and Nolscher for reasons set forth above.

The DeSimone reference has apparently been relied upon for providing a polymer coating that is insoluble in water having a pH less than or equal to a specified
10 pH but DeSimone does not make up for the above-stated deficiencies of the combination of Richter and Nolscher because DeSimone does not provide sequential exposure operations, much less sequential exposure operations using different photomasks.

Therefore, independent claim 17 and also dependent claims 20-22 are
15 distinguished from Richter, Nolscher and DeSimone, taken alone or in combination. The rejection of claims 20-22 under 35 U.S.C. § 103(a), should be withdrawn.

Appl. No. 10/780,946
Amdt. dated 04/15/2008
Response to Office Action of 01/17/2008

Attorney Docket No.: N1085-00201
[N1280-175.2003-0489]

CONCLUSION

Based on the foregoing, each of pending claims 1-8 and 17-23 is in allowable form and the application in condition for allowance, which action is respectfully and expeditiously requested.

- 5 The Assistant Commissioner for Patents is hereby authorized to charge any fees necessary to give effect to this filing and to credit any excess payment that may be associated with this communication, to Deposit Account 04-1679.

Respectfully submitted,

10

Dated: 15 April 2008


Mark J. Marcelli, (Reg. No. 36,593)
Attorney for Applicants

15

20 DUANE MORRIS LLP
101 West Broadway, Suite 900
San Diego, CA 92101
Telephone: (619) 744-2200
Facsimile: (619) 744-2201